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(54) Collapsible flat-folding chair

(57) A collapsible flat-folding chair comprises forwardly directed lateral openings 32 on a backrest 26 or other component thereof. Rearwardly directed hook formations 34 being adapted to engage in said lateral openings of an adjacent chair to assist stacking of the chairs. The backrest comprises upper and lower parts 30, 28 interconnected by a hinge 60. It has an opening 36 comprising a forward socket section and a rearward spigot section of complementary engaging formation so that the spigot and socket formations of adjacent chairs can interfit to assist stacking. A rack on the underside of the seat 40 engages a pinion on a support member 48.

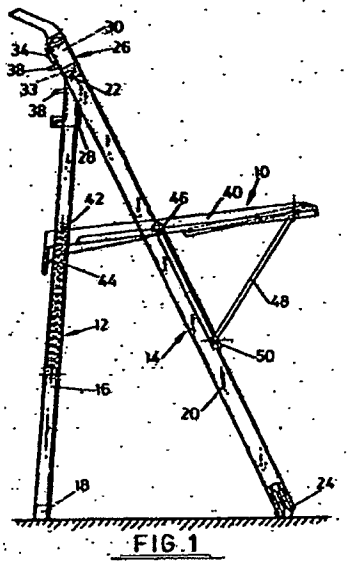

FIG. 1

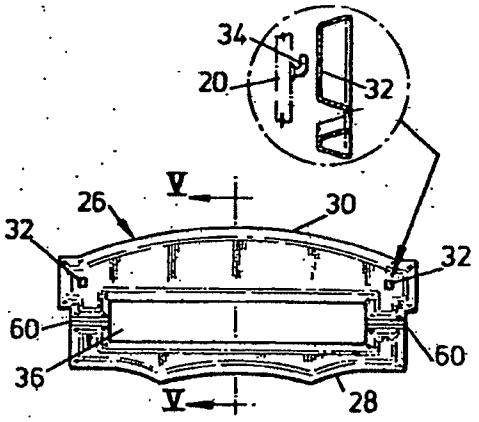

FIG. 4

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The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.

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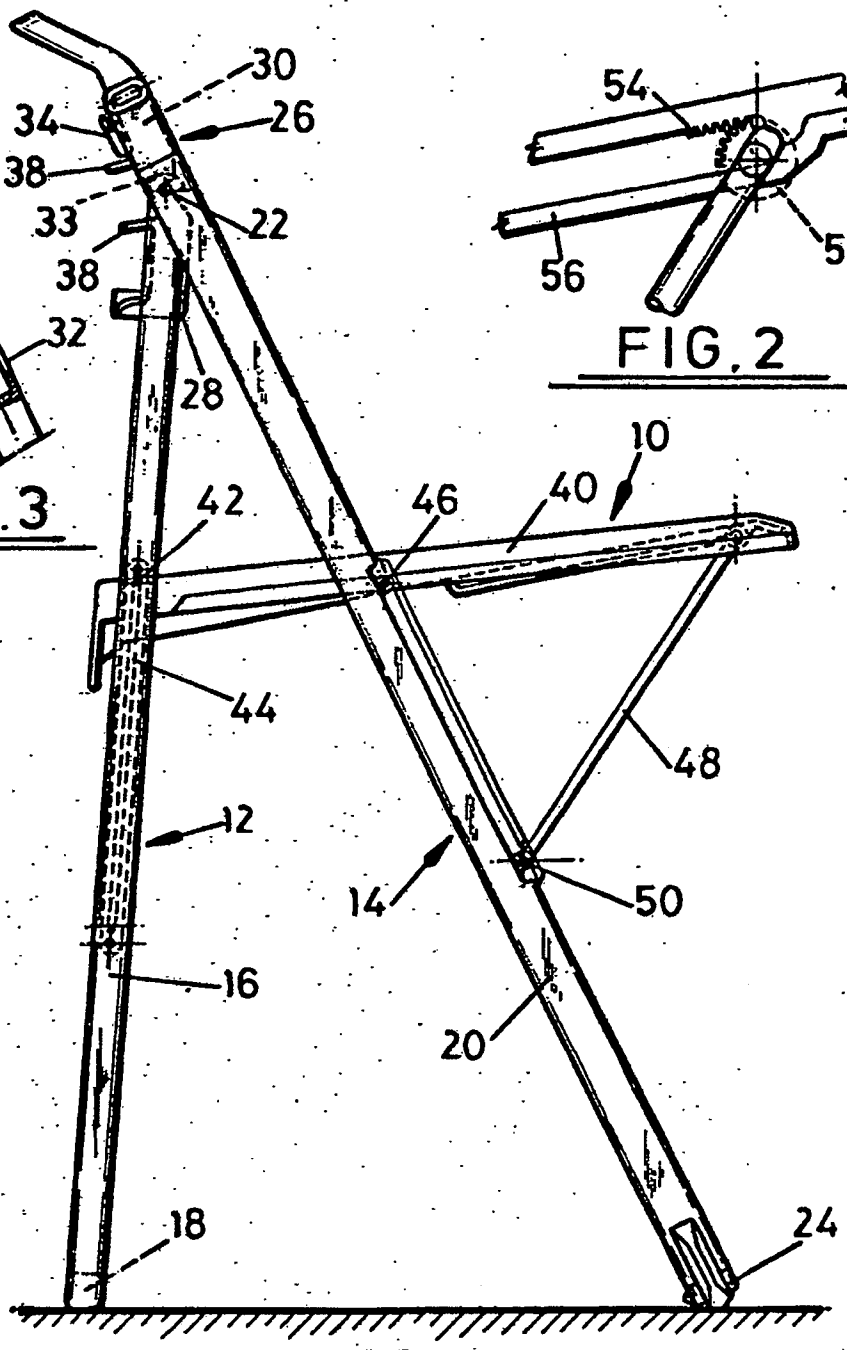

FIG.1

FIG.2

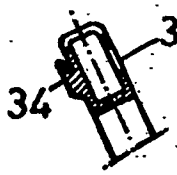

FIG.3

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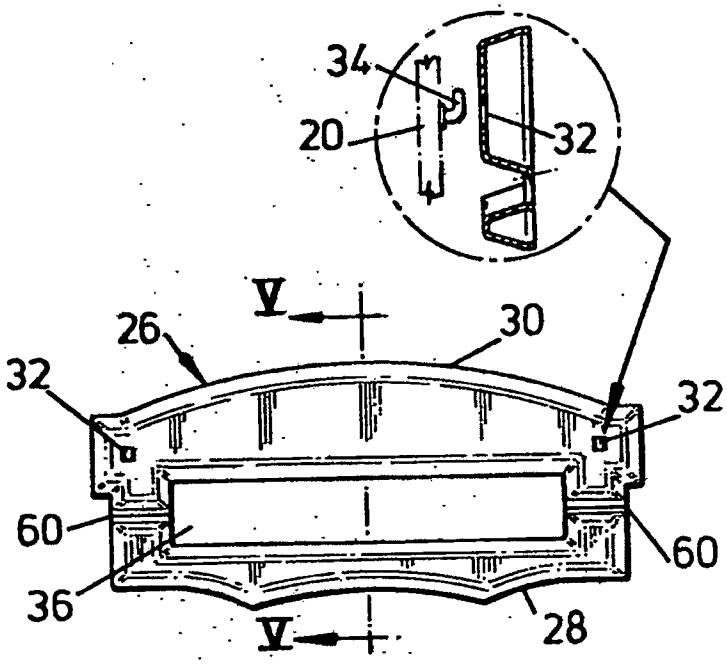

FIG. 4

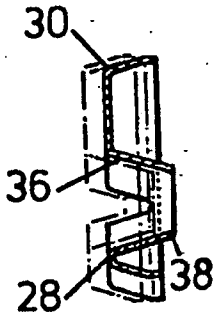

FIG. 5

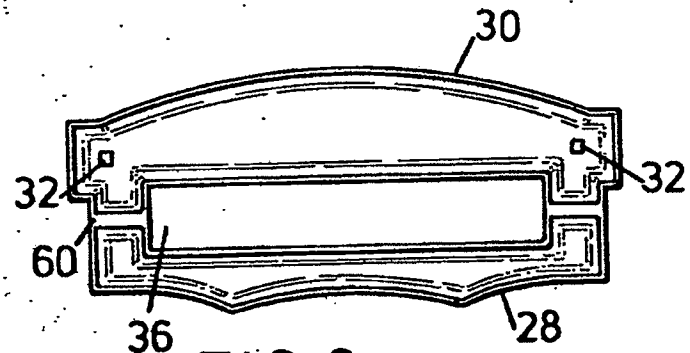

FIG. 6

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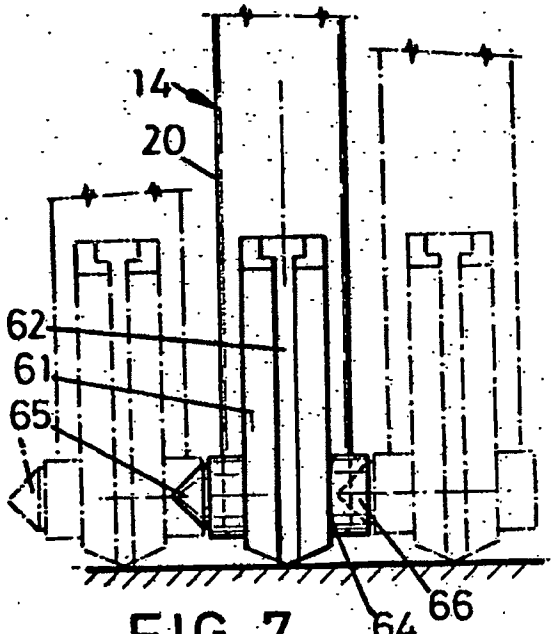

FIG.7

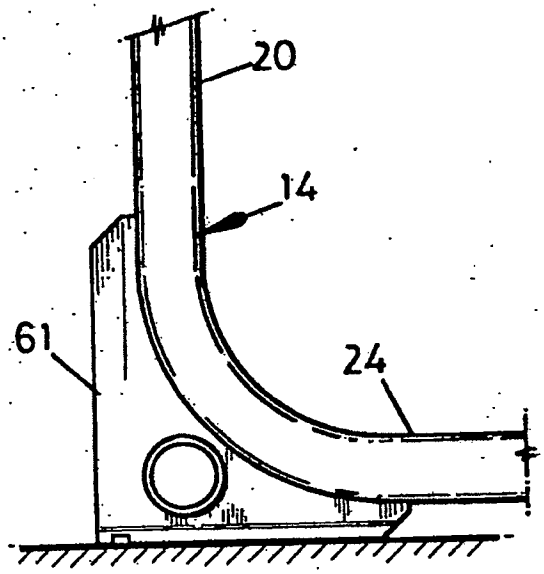

FIG.8

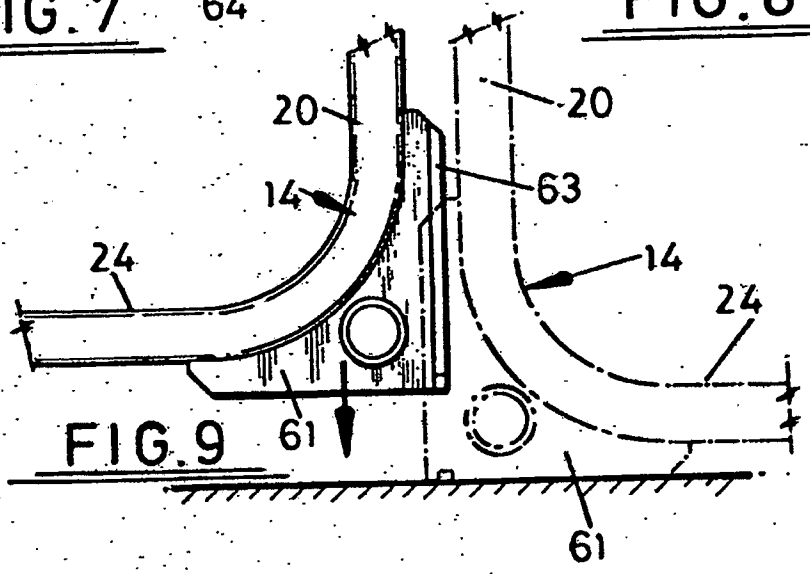

FIG.9

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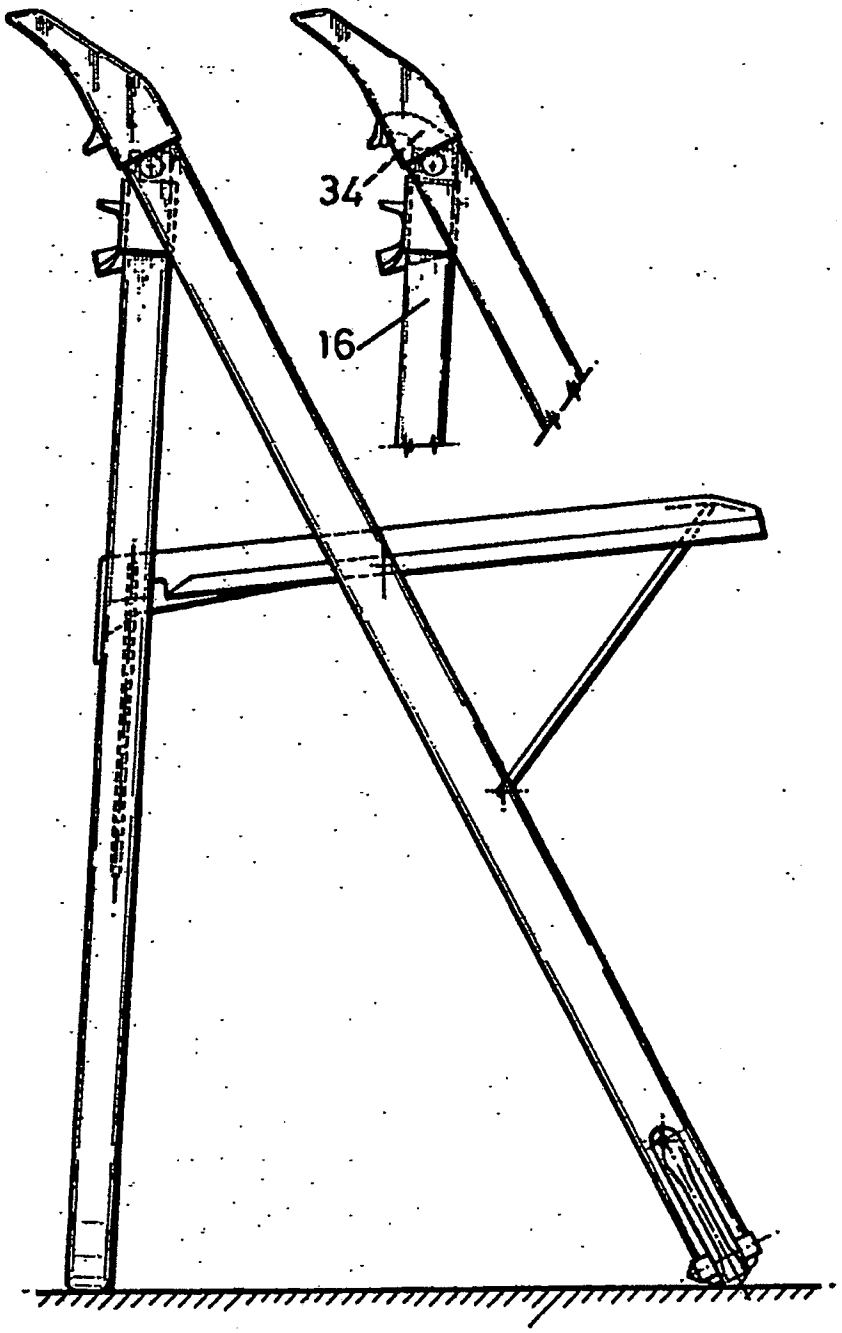

FIG.10

COLLAPSIBLE CHAIR

The present invention relates to collapsible chairs particularly those capable of a folding/stacking/hanging facility.

It is desirable that collapsible chairs should be designed to facilitate easy stacking or hanging from supports on walls without the necessity of the wall supports themselves projecting substantial distances from the walls.

The present invention seeks to provide an improved form of collapsible chair.

According to the present invention there is provided a collapsible flat-folding chair, comprising forwardly directed lateral openings on a backrest or other component thereof, and rearwardly directed hook formations adapted to engage in said lateral openings of an adjacent chair to assist stacking of the chairs.

The present invention is further described hereinafter, by way of example, with reference to the accompanying drawings, in which :

Fig. 1 is a side elevation of a preferred form of collapsible chair according to the present invention;

Fig. 2 is a detail of the chair of Fig. 1; and

Fig. 3 is a partial section through another portion of the chair of Fig. 1;

Fig. 4 is a view from the front of the backrest shown in Fig. 1;

Fig. 5 is a sectional view of the backrest of Fig. 4 on line V-V;

Fig. 6 is a corresponding view from the rear of

the backrest;

Fig. 7 is an enlarged view of an interlocking (female) fitment also shown in Fig. 1;

Fig. 8 is a view from the front of said fitment;

Fig. 9 is an enlarged front view of an interlocking (male) fitment partially engaged with the female fitment, and

Fig. 10 is a diagrammatic view of an alternative embodiment of chair according to the invention with a scrap view showing the hook in position.

The drawings show a collapsible chair 10 which has a rear frame 12 and a seat support frame 14, both frames being generally rectangular in shape.

The rear frame 12 has two upright parallel side limbs 16 (only one of which is shown in the drawings) interconnected at or adjacent their lower ends by a cross member 18. The upper ends of the side limbs 16 are pivoted to respective side limbs 20 of the seat support frame 14 by way of pivot hinges 22, the latter being positioned a selected distance from the upper ends of the side limbs 20. The side limbs 20 of the seat support frame are interconnected at their lower ends by a cross member 24 and lie outside the side limbs 16 of the rear support frame so that when the chair is collapsed into a folded attitude the rear support frame 12 lies within and substantially in the same plane as the seat support frame 14.

The chair is provided with a backrest 26 extending between the side limbs 16 and 20. The backrest is formed in two portions, a lower portion 28 and an upper portion 30, interconnected by a live hinge 33 whose hinge axis is coaxial with the axes of the pivot hinges 22. The hinge 36 may be of the kind known as a floating or "Twinlock" (RTM) hinge.

The lower portion 28 of the backrest is secured

to the rear support frame side limbs 16 while the upper portion 30 is secured to the upper end regions of the seat support frame side limbs 20, this being the reason that the side limbs 16 are pivoted to the side limbs 20 at a preselected distance from the upper ends of the latter.

The backrest therefore adopts the attitude shown in Fig. 1 when the chair is in its operative position and provides lumbar, mid and high back support.

The backrest is conveniently made of plastics material and the upper portion 30 is formed on its front face at each side with a respective slot 32. In register with each slot 32 a projecting hook 34 is provided at the rear portion of the backrest upper portion 30 and may be held in the top end of the respective side limbs 16 as seen in Fig. 10. The backrest is also provided with a central opening 36 through which the axis of the live hinge 33 extends, the upper and lower edges of the opening being bounded by rearwardly projecting flanges 38.

The openings 32 and 36, the hooks 34 and the flanges 38 allow a series of chairs in their collapsed attitude to be hung together on a wall mounting with each chair being supported on the next inner chair, except for the innermost chair which is supported directly on the wall mounting. In use, the two hooks 34 of a chair engage through slots 32 in the next inner chair while the curvature of the opening 36 and flanges 38 enable the flanges to sit in the opening in the next inner chair, the hooks 34 of the outer chair and the openings 32 of the next inner chair effectively combining to form a pivotal hanging configuration, the outer chair being retained in position by its weight acting through the hooks 34 and flanges 38.

The chair has a seat 40 which is conveniently moulded from plastics material and at its rear end has two coaxial, laterally projecting lugs 42 which engage in respective slideways 44 formed in the side limbs 16. The seat itself is pivoted to the side limbs 20 of the seat support frame by way of fixed pivot pins 46 so that as the chair is collapsed, the seat pivots in an anti-clockwise direction as seen in Fig. 1 about the fixed pivots 46, the lugs 42 being guided along the sideways 44 to pivot the rear support frame 12 towards the seat support frame 14. Support for the front edge region of the seat 40 is provided by a cantilever support member 48 which is of generally U-shape configuration with the free ends being pivoted to the respective side limbs 20 by way of fixed pivots 50 having a common axis. The base of the support member 48 supports the seat 40 by way of a rack and pinion assembly which is shown in greater detail in Fig. 2. The base of the support member 48 carries a gear wheel 52 whose teeth engage in a rack 54 formed on the underside of the seat 40, the rack extending from adjacent the seat pivots 46 to adjacent the front edge of the seat. A flat bar 56 which is secured to the seat parallel with and in spaced relation to the rack 54 retains the gear wheel 52 in engagement with the rack.

The arrangement is such that the support member 48 provides additional strength and support to the front edge region of the seat 40, enabling the latter to be moulded from suitable plastics material, while the rack and pinion assembly provides a smooth action during folding and opening of the chair. This avoids the possibility of the chair suddenly snapping into its collapsed attitude while it is being folded and perhaps causing injury. The use of the rack and

pinion assembly also considerably reduces wear and increases the life of the chair.

Referring to Figs. 4 to 6 it will be apparent that the openings or slots 32 are provided at the front and to the side of the upper portion 30 of the backrest 26 whereas the projecting hooks 34 are provided at corresponding positions on the side limbs 20 to the rear of the backrest portion 30. The hinge arrangement comprises integrally moulded flexible webs of plastics material interconnecting the upper and lower portions 30, 28 of the backrest 26. The two portions 28, 30 of the backrest 26 are moulded in synthetic plastics material with rounded front edges and a recessed back bounded by flanges. Those flanges 38 flanking the central opening 36 are extended rearwardly and together form a spigot formation which is of complementary shape to a socket formation provided by a front section of the opening 36. The spigot formation of one chair is thus capable of locating in the socket formation of the next adjacent chair when the chairs are stacked one on the other. Such stacking may, but need not necessarily, involve the suspension of successive chairs on each other in which case the otherwise optional slots 32 and hooks 34 are necessary.

Turning now to Figs. 7 to 9 an interlocking fitment (which in this case is shown as a separate fitment but may be made integral with the chair) comprises a plastics body 61 of generally L-shape with a curved inner face shaped to conform with and be attached (as by adhesive) to a bottom corner of the seat support frame 14 at the junction of a side limb 20 and the cross member 24. The upright limb of the plastics body 61 (in the case of the female fitment) has a slideway 62 of dovetail configuration

with tapered lead-ins at each end. The male fitment shown in Fig. 9 has on its corresponding side limb a male formation 63 of dovetail section adapted to slide into the slideway 61 from either end thereof so as to be held therein against lateral separation. A male fitment is provided at one corner of the support frame 14 while a female fitment is provided at the opposite corner. Adjacent chairs can then be interconnected simply by sliding one fitment onto or into the complementary fitment on the adjacent corner of the neighbouring chair. It will be appreciated that while such fitments have been described in the context of a collapsible chair having certain design features the fitments may be made and sold independently for attachment to collapsible or other chairs where it is necessary or desirable to link adjacent chairs in rows as in an auditorium. The fitments have an additional feature not so far described and this is an integrally moulded peg 64 with a pointed rear end 65 and a correspondingly recessed front end 66. This feature is particularly useful in collapsible chairs of the kind described because it enables the bottom corners of the stacked chairs to be located positively with respect to each other by location of the pointed ends 65 of the pegs 64 of one chair in the front peg recesses 66 of the adjacent chair as shown in Fig. 7.

It will be appreciated that numerous modifications may be made to the design herein described without departing from the scope of the invention.

CLAIMS

1. A collapsible flat-folding chair, comprising forwardly directed lateral openings on a backrest or other component thereof, and rearwardly directed hook formations adapted to engage in said lateral openings of an adjacent chair to assist stacking of the chairs.

2. A chair as claimed in claim 1 having in its backrest an opening comprising a forward socket section and a rearward spigot section of complementary engaging formation such that the spigot and socket formations of adjacent chairs can interfit to assist stacking of the chairs.

3. A chair as claimed in claim 1, wherein the spigot section is provided by rearweardly directed flanges flanking said opening.

4. A chair as claimed in any one of claims 1 to 3, comprising a rear support frame pivotally interconnected at its upper end to a front support frame, and a seat pivotally mounted on said frames.

5. A chair as claimed in claim 4, wherein the seat is pivoted intermediate its front and rear ends to the front support frame and support means is provided for the front end region of the seat, the support means being pivotally connected to said front support frame and coupled to said seat so as to provide a smooth closing and opening action for the chair.

6. A chair as claimed in claim 5, wherein the smooth closing and opening action for the chair is provided by a rack and pinion assembly having a rack on the underside of the seat and a pinion mounted on said support means and constrained to run on said track.

7. A chair as claimed in claim 4, wherein the front support frame extends above said pivotal connection and the backrest has an upper portion fixed to said front support frame above said pivotal connection and a lower portion fixed to said rear support frame below said pivotal connection such that said portions are mutually inclined in use to provide improved back support for a user.

8. A chair as claimed in claim 7, wherein said portions are interconnected by a hinge.

9. A chair as claimed in any one of the preceding claims having interlocking means comprising complementary engaging male and female formations so arranged at opposite sides of the chair that a male formation at one side can be engaged with and disengaged from a female formation at the adjacent (other) side of a neighbouring chair.

10. A chair as claimed in claim 9, wherein said male and female formations are adapted to interengage by a sliding action involving lifting of one chair relative to its neighbour.

11. A chair as claimed in claim 10, wherein said male and female formations are of dovetail section.

12. A collapsible flat folding chair substantially as herein described with reference to the accompanying drawings.

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